

ADVERTISED PLAN

NDYLIGHT
LIGHTING DESIGN

CONSULTANT ADVICE NOTICE

PROJECT: BAPS HINDU MAHĀ MANDIR, MELBOURNE

CAN NO: N-002[2.0]

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OBTRUSIVE LIGHTING ADVICE

This Consultants advice is intended to inform Designers and the project of best practice lighting design guidelines applicable to the BAPS Hindu Mahā-Mandir, Melbourne located at 1390-1450 Western Port Hwy, Cranbourne South Vic 3977. This advice should be read in conjunction with:

- Australian Standards, AS/NZS 4282:2023 *Control of the Obtrusive Effects of Outdoor Lighting*
- National Light Pollution Guidelines for Wildlife
- Nature Advisory documentation
- N-001_ca260202m0027[3.0]_ECOLOGICAL LIGHTING.pdf

NDYLIGHT's previous advice (N-001_ca260202m0027[3.0]_ECOLOGICAL LIGHTING.pdf) covers many applications and provides guidelines around the mitigation of spill light that also applies to obtrusive lighting.

General

The specific lighting design within the development is yet to be developed and therefore cannot be commented on at this stage as its potential impacts are unknown. This advice provides general advice, guidelines and specific technical parameters which are to be applied during the design phase in order to satisfy the 'light technical parameters' noted within Australian Standards, AS/NZS 4282:2023 *Control of the Obtrusive Effects of Outdoor Lighting*.

General recommendations are provided within the Australian standards and the National Light Pollution Guideline for Wildlife. A summary of these guidelines are provided below.

Management actions summary:

- Start with natural darkness and only add light for specific purposes.
- Use adaptive light controls to manage light timing, intensity and colour.
- Light only the object or area intended – keep lights close to the ground, directed, and shielded to avoid light spill. Using mechanical methods (shields, snoots, diffusers) to prevent spill light and ensure light spill is restricted to areas needing illumination
- Use the lowest intensity lighting appropriate for the task.
- Use non-reflective, dark-coloured surfaces.

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- Use lights with reduced or filtered blue, violet and ultraviolet wavelengths
- External construction limited to daylight hours, so no artificial light is used

Objective:

To ensure that lighting design and implementation at the site – encompassing car parks and communal areas – minimises the amenity impact on surrounding/adjoining semi-rural properties and environments.

Site overview:

The site appears to be within a semi-rural zone with neighbouring properties a fair distance away relative to suburban areas. Additionally, there appears to be vegetation along neighbouring properties and on the developments site which aids in obstructing obtrusive light.

Based on our understanding of the site and as agreed with the broader development team, the site has been classified as a zone A2 per table 3.1 of AS/NZS 4282:2023 *Control of the Obtrusive Effects of Outdoor Lighting*.

Table 3.1 — Environmental zones

Environmental zones	Ambient light conditions	Descriptions/ Examples
A0	Intrinsically dark	UNESCO Starlight Reserve. IDA: Dark Sky Parks, Reserves or Sanctuaries Major optical observatories Other accreditations for dark sky places for example astrotourism, heritage value, astronomical importance, wildlife/ecosystem protection Lighting for safe access may be required
A1	Dark	Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas) Generally roadways without streetlighting through rural areas
A2	Low district brightness	Sparsely inhabited rural and semi-rural areas Generally roadways without streetlighting through suburban, rural or semi-rural areas other than intersections
A3	Medium district brightness	Suburban areas in towns and cities Generally roadways with streetlighting through suburban, rural or semi-rural areas
A4	High district brightness	Town and city centres and other commercial areas Residential areas abutting commercial areas Industrial and Port areas Transport Interchanges
TV	High district brightness	Vicinity of major sport and event stadiums during TV broadcasts
NOTE Zones A0 and A1 would normally have a minimum area of 50 ha.(0.5 km ²). There may be smaller environmentally sensitive areas.		

- Figure 1 - Table 3.1 Environmental Zones

The environmental zones used for assessment have been selected based on the ambient light conditions and descriptions included in the above table.

Based on the applicable environmental zone, the below light technical parameters apply and per table 3.2, 3.3 and 3.4 of AS/NZS 4282:2023 *Control of the Obtrusive Effects of Outdoor Lighting*.

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Table 3.2 — Light technical parameter limits

Zones	Maximum vertical illuminance (E_v) lux		Threshold increment (TI)		Upward Light Ratio
	Non-curfew	Curfew	Maximum TI %	Default Adaptation level (L_{ad}) cd/m ²	Maximum ULR _S or ULR _L
A0	0 ^a	0.0	N/A	N/A	0.00
A1	2	0.1	20	0.1	0.00
A2	5	1	20	0.2 ^b	0.01
A3	10	2	20	1	0.02
A4	25	5	20	5	0.03
TV	N/A	N/A	20	10	0.08

^a For A0, E_v shall be as close to zero as practicable without impacting safety considerations.

^b For an internally illuminated sign in a A2 zone, $L_{ad} \leq 0.25$ cd/m²

Figure 2 - table 3.2 - Light Technical Parameter Limits

Table 3.3 — Maximum luminous intensities per luminaire

Zone	Luminous intensity (I), cd		
	Non-curfew Level 1 (L1)	Non-curfew Level 2 (L2)	Curfew
A0	See Note	See Note	0
A1	2 500	5 000	500
A2	7 500	12 500	1 000
A3	12 500	25 000	2 500
A4	25 000	50 000	2 500
TV	100 000	165 000	0

NOTE For A0, I shall be as close to zero as practicable without impacting safety considerations.

Table 3.4 — Maximum average luminance of surfaces (cd/m²)

Application conditions	Environmental zones				
	A0	A1	A2	A3	A4
See Clause 3.3.3	0.1	50	150	250	350

Figure 3 - table 3.3 and 3.4 - Maximum luminous intensities per luminaire and Maximum Average Luminance of Surfaces.

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Recommendations:

The below are guidelines and recommendations, which have been developed in consultation with Nature Advisory, to specifically address the application of light at BAPS Hindu Mahā-Mandir, Melbourne, based on the advice and information provided to us.

Note: This advice and the recommendations herein are general only and are based on good practice design and tailored to the site based on information provided to us.

1. Light Intensity and direction

- a. Use low intensity shielded luminaires to reduce light spill and glare. This includes the use of internal or external shields such as snoots, diffusers, visors, etc. used appropriately and as needed to minimise and/or eliminate unwanted light spill to areas that are not intended to be illuminated. Example shielded luminaires below.



Figure 4 - Externally Shielded Luminaire



Figure 5 -Internally Shielded Luminaire

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- b. Ensure lights are directed downward and focussed on necessary areas to prevent light spill.
 - i. Use of luminaires with Upward Light Output Ratio (ULOR) equal to 0%. (This is less than the allowed 0.01 for A2 environmental zone).
 - ii. Use adjustable (tiltable) luminaires
 - iii. Use luminaires with low peak intensities

2. Light Colour Temperature (Correlated Colour Temperature – CCT)

- a. Opt for warmer colour temperatures (3000K or lower) to minimise disruption to wildlife.
- b. Consider the use of tuneable luminaires with LED's that have little to no blue light.

3. Lighting controls

- a. Use of lighting controls, motion sensors and timers to limit lighting to periods where needed, particularly within non-curfew and curfew times, reducing prolonged exposure. Unless otherwise specified by a relevant authority, the curfew period should be taken as being between 11pm and 6am as per clause 3.2.1 in AS/NZS 4282:2023
- b. Use of lighting controls allows the flexibility to adjust the lighting strategy in future, should it be required.

4. Vegetation Buffering

- a. Consider utilisation of vegetation buffers or barriers to help block and diffuse light before it reaches sensitive habitats or neighbouring properties.

By adhering to these recommendations, good design practices and the applicable clauses and recommendations within AS/NZS 4282:2023, we remain confident that obtrusive lighting light technical parameters can be satisfied.

We recommend the design team provide verification of calculations, clearly depicting calculations results for obtrusive lighting as per AS/NZS 4282:2023 *Control of the Obtrusive Effects of Outdoor Lighting* for review by the Design team, Client team and relevant authorities.

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